

New Species of *Calandrinia* (Portulacaceae) from Queensland, Australia

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Two species of *Calandrinia* Kunth. (Portulacaceae), *C. arenicola* and *C. tumida* are described here as new. Pollen and seed morphology are described. Distribution maps of both species are provided. S.E.M. micrographs of seed and pollen are given. The affinities of the new species are discussed. Keys are also provided to distinguish these species from their close relatives.

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INTRODUCTION

The genus *Calandrinia* comprises ca. 100 species. Thirty four species grow in Australia, and the remainder in America. The Australian species were first reviewed by Bentham (1863) and were last reviewed by Syeda (1979).

The new species *C. tumida* belongs to section *Basales* von Poellnitz, and *C. arenicola* belongs to sect. *Pseudodianthoideae* von Poellnitz. These sections were recognized by von Poellnitz (1934), Syeda (1979) and Syeda and Carolin (1989).

In the review of *Calandrinia* by Syeda (1979) based on a detailed study of general morphology, seed type and pollen type, it was found that several collections from Queensland did not agree with any of the species previously described. These specimens are here assigned to two new species.

C. arenicola Syeda sp. nov.

Herba prostrata carnosa scapis pluribus 5–55 cm longis. Folia basalia caulinaeque oblanceolata usque lanceolata petiolata. Flores in pedicellis patulis, bracteis scariosis vel herbaceis. Petala 6 oblanceolata vel anguste spatulata. Stamina ca. 12. Stigmata tria libera usque ad basim. Capsula valvis tribus. Semina nigra subreniformia granulata hebetata.

Prostrate succulent reddish herb with a short stem. Scapes several, arising from the axils of the basal leaves, 5–55 cm long. Leaves several at the base as well as on the scapes, petiolate, lanceolate to oblanceolate, 2.5–5.5 cm long, 2–5 mm broad; petiole 5–12 mm long; upper leaves smaller. Flowers many in monochasia; bracts scariosus as well as leafy, alternating, 0.7–1.3 mm long; pedicel spreading, 3–13 mm long. Sepals ovate, acuminate-mucronate, 4–5.5 mm long, 3.5–4.5 mm broad. Petals 6, white to pink, oblanceolate to narrow spatulate, 5–7 mm long, 1.5–2.5 mm broad. Stamens 12 or 13, filaments of unequal length, flat, connate at the base to form a membranous cup around the base of the ovary, 2–4 mm long; anther oblong, versatile, 0.4–0.6 mm long, ca. 0.3 mm broad. Ovary globular, 2.5–3.5 mm long; stigmas 3, free to the base,

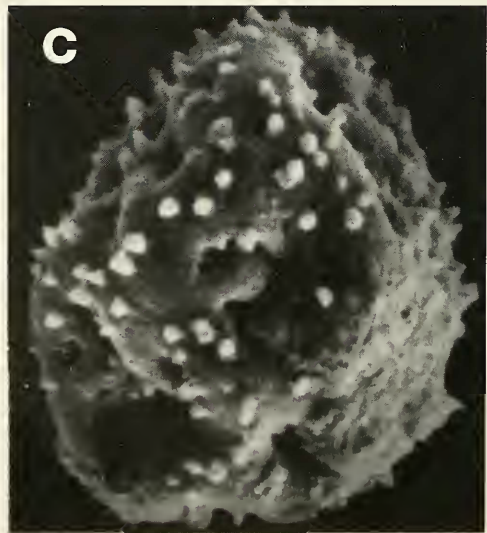
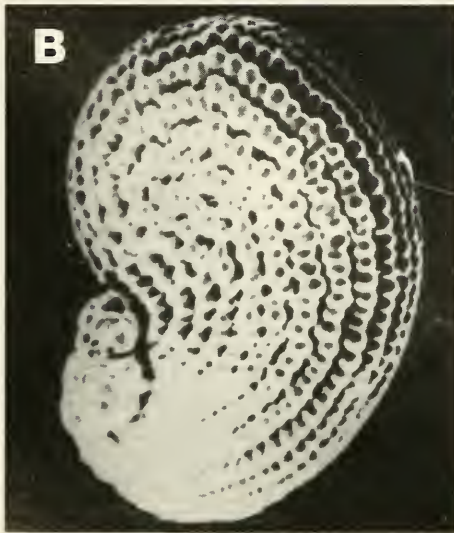


Fig. 1. *Calandrinia arnicola* Syeda, sp. nov. A- distribution map; B- Seed 60X; C-Pollen grain 3000X

whitish, sparsely hairy, 1–1.5 mm long; ovules many, ca. 0.20 mm broad, reniform, attached to a basal placenta. Fruit a capsule, ovoid-globular, 3-valved from the summit, usually as long as the sepals.

Holotype

Cooktown, mouth of Endeavour River, north bank, S.T. Blake 23295, 16-5-1970 (BRI 172485). Isotypes: NSW, CANB.

Pollen morphology

Pollen grains irregular in shape, irregularly angled in outline, 20.0–21.2 μm in diameter. Apertures not distinct; notches present all over the pollen surface, variable in size and shape, (Fig. 1C). Sexine tectate 1.6–2.0 μm thick, usually more thickened in the convex part. Tectum papillate, non-punctate; the papillae small, broad, closely to irregularly distributed, usually of uniform size. Bacula sparsely standing, thin. Nexine half of the sexine thickness or thinner.

Voucher specimen

Cooktown, mouth of Endeavour River, S.T. Blake 23295, 16-5-1970 (NSW) type material.

Seed morphology

Seed black, broadly reniform, dull glossy, surface pattern aligned-papillate, numerous in each capsule, ca. 1.2 mm long, ca. 1 mm broad, (Fig. 1B).

Voucher specimen

Cooktown, mouth of Endeavour River, S.T. Blake 23295, 16-5-1970 (BRI 172485).

Distribution and ecology

Cape York and Carpentaria region of Queensland (Fig. 1A). Coastal sand dunes.

Discussion

The seeds of *C. arenicola* show some superficial resemblance to those of *C. balonensis* Lindl. but in other characters it is very different from *C. balonensis*. *C. arenicola* has oblanceolate to narrow spatulate petals, petiolate leaves, stigmas free to the base, few stamens, and one leafy and one scarious bract at each node.

Morphologically *C. arenicola* is very close to *C. eremaea* Ewart, but differs in bract and seed characters. The following key is provided to assist in separating these related species.

- 1 Bracts all scarious; pedicel reflexed in fruit; seeds colliculate, papillate, usually with coppery lustre *C. eremaea*
- 1* One leafy and one scarious bract in each pair; pedicel not reflexed in fruit; seeds, aligned papillate, without coppery lustre..... *C. arenicola*

The pollen characters of *C. arenicola* distinguish it from all other species of *Calandrinia*. This species has the smallest pollen grains of irregular shape with deep

notches and no distinct apertures. Further detailed investigation of the pollen of this species is needed.

Syeda and Carolin (1988), while discussing the phylogeny and origin of Australian *Calandrinia*, indicated that *C. arenicola* shares characters with both sect. *Pseudodianthoideae* von Poellnitz and sect. *Basales* von Poellnitz.

C. arenicola has the characteristic stigma and capsule valve number of sect. *Pseudodianthoideae*, but is unique in its seed surface pattern, and in having inaperturate pollen. It appears that this might be a connecting species between sect. *Pseudodianthoideae* and sect. *Basales*. The reason for suggesting *C. arenicola* as a connecting species is based on the phylogenetic study (Syeda and Carolin 1990) which reveals that *C. arenicola* is very close to the members of sect. *Basales* and, more importantly, it shares equally the primitive and advanced characters. In a cladistic analysis of *Calandrinia* (Syeda and Ashton 1989) using PHYSYS the result led to questioning the placement of *C. arenicola* and *C. strophiolata* F. Muell. in sect. *Basales*.

Specimens examined

Little Lagoon, Groote Eylandt, in the Gulf of Carpentaria, R.L. Specht 233, 13-4-1948 (AD, BRI, CANB and NSW); Lizard Island, N. Byrnes 3191, 7-5-1975 (BRI); Lizard Island (Great Barrier Reef), F.R. Fosberg 55017, 26-6-1973 (BRI); Cape Flattery, 53 km. NNE. of Cooktown, T.J. McDonald 1577, 15-4-1975 (BRI).

C. tumida Syeda sp. nov.

Herba erecta annua 7-35 cm alta. Scapis pluribus. Folia linearia plerumque basalia. Flores in pedicellis patulis. Sepala interdum decidua. Petala 8-10, lanceolata. Stamina numerosa. Stigmata 4-5 libra usque ad basin. Capsula indurata circumscissa ad basim, decidua. Semina numerosa orbiculario-reniformia atrofusca vel nigra in centro tumida.

Erect annual herb with a very short stem. Scapes several, arising from the axils of the few basal leaves, 7-35 cm high. Leaves several, mostly at the base, rarely on the scapes, sessile, linear, obtuse, 10-40 mm long, 0.75-1.0 mm broad. Flowers arranged in monochasia; pedicel spreading-erect, 3-16 mm long. Bracts scarious, acute, alternate to opposite, 0.5-1.0 mm long. Sepals broad-ovate, obtuse, thin, 4-4.5 mm long, 4.5-5.5 mm broad. Petals lanceolate, purple, 4.5-6.0 mm long, 1.5-3.0 mm broad. Stamens numerous; filaments of unequal length, united at the base in a ring around the ovary, slightly adnate to the base of the petals, hairy at the base, 1.7-3.5 mm long; anther oblong, versatile, 0.5-0.6 mm long, 0.2-0.3 mm broad. Ovary globular, pale, thick, 1.8-2.2 mm long; stigmas 4-5 free to the base, hairy, 1.5-2.0 mm long; ovules numerous, red-brown, reniform, ca. 0.16 mm long and 0.14 mm broad, attached to an unbranched free central placenta. Fruit a capsule, globular, circumsciss at the base to half of its length in the form of a cup, deciduous with or without sepals, as long as or little longer than sepals.

Holotype

19.2 km north of Esmeralda station, Queensland, N.H. Speck 4732A, 18-7-1957 (CANB). Isotypes: BRI007376, AD961032031, MEL.

Pollen morphology

Pollen grains spheroidal in shape, circular in outline, 35.0-39.2 μm in diameter, 18 or more pantoporate nonoperculate (Fig. 2C). Pori \pm sunken, circular or sometimes elongated, 2.8-4.5 μm in length, 2.5-3.5 μm in breadth. Apertural membrane with closely spaced and irregularly distributed spinules, the spinules small, rather broad, varying in size.

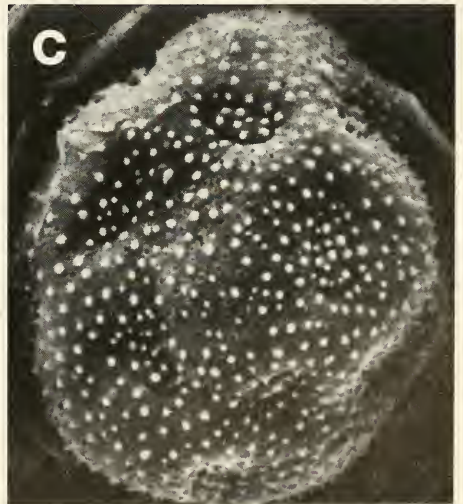
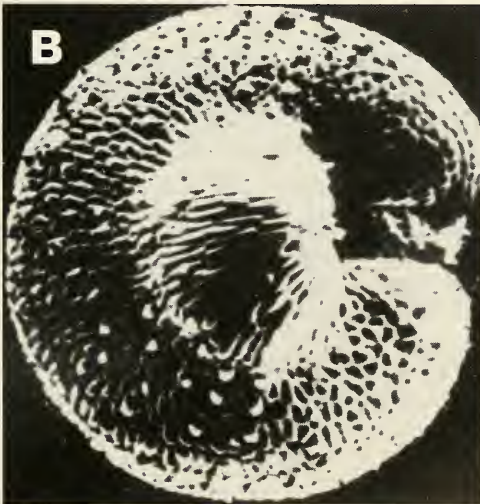


Fig. 2. *Calandrinia tumida* Syeda, sp. nov. A- distribution map; B- Seed 100X; C-Pollen grain 2000X

Sexine tectate, ca. 2.4 μm thick in the centre of mesopodium, gradually thinner towards the apertures. Tectum spinulose and punctate; the spinules small, broad, closely to irregularly distributed, varying in size. Punctae distinct, more numerous, wide in the centre of mesopodium, rather closely spaced, a few longish, mostly of same diameter. Bacula distinct, standing evenly to sparsely. Nexine ca. 0.6–1.0 μm thick.

Voucher specimen

19.2 km north of Esmeralda Station, Queensland, N. H. Speck 4732A, 18-07-1957 (AD 961032031).

Seed morphology

Seeds black or dark brown, reniform to orbicular, with a bulging centre, glossy, colliculate-tuberculate, numerous in each capsule, 0.35–0.45 mm in diameter (Fig. 2B).

Voucher specimen

19.2 km north of Esmeralda Station, Queensland, N. H. Speck 4732A, 18-07-1957 (AD 961032031).

Distribution and ecology

Southern Cape York, Queensland, Australia. (Fig. 2A). An erect herb on sandy soil in open forest.

Discussion

C. tumida is morphologically close to *C. spergularina* F. Muell. in the dehiscence of the capsule and to some extent its distribution, but it is distinguished from *C. spergularina* in having 8–9 petals, numerous stamens, and most clearly in its seeds which are reniform-orbicular with bulging centres that have a colliculate-tuberculate pattern. A key is provided to help in separating these closely related species.

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|----|--|------------------------|
| 1. | Stamens 5–13; petals 6, white; seed ovate without bulging centres, colliculate | <i>C. spergularina</i> |
| 1* | Stamens more than 20; petals 8–10, purple; seed reniform-orbicular with bulging centres, colliculate-tuberculate | <i>C. tumida</i> |

The seeds of *C. tumida* are reniform-orbicular with a bulging centre, a characteristic found only in this species. Moreover, some of the diagnostic morphological characters show it to be a very distinct species of *Calandrinia*. The capsule is circumscissile in its upper half, a feature showing resemblance to *Portulaca*, but the superior ovary is a characteristic feature of *Calandrinia*.

C. tumida has pollen with irregular apertures in depressions or notches acquiring mostly circular to somewhat elongated shapes. Hence, pollen type may be considered as pantoporate.

Specimens examined

Yarraden Station, ca. 24 km S. of Coen, J. Wright 153, July 1967 (BRI 236857); Kennedy Rd., 72 km beyond Laura, C.H. Gittins 977, July 1965 (BRI 077429).

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